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eighteen misspellings out of a total number of 768 specific and subspecific names, and the generic and other names accompanying. These are of course not due to ignorance on the part of the members of this body, some of whom are distinguished for scholarship, but because of an extreme view of the law of priority.

In closing I wish to utter a plea for euphony and brevity in the construction of names. In some quarters the making of such names is an unknown art. The simple and appropriate names of Linneus and Cuvier can be still duplicated if students would look into the matter. A great number of such names can be devised by the use of significant Greek prefixes attached to substantiatives which may or may not have been often used. Personal names in Greek have much significance, and they are generally short and euphonious. The unappropriated wealth in this direction is so great that there is really no necessity for poverty in this direction. It should be rarely necessary, for instance, to construct generic names by adding prefixes and suffixes of no meaning to a standard generic name already in use.

SOME LOCALITIES FOR LARAMIE MAMMALS AND HORNED DINOSAURS.

By J. B. Hatcher.

It is the purpose of this paper to give brief but accurate descriptions of the localities for the most important and best preserved specimens of Laramie mammals and horned and other dinosaurs collected by the writer for the U. S. Geological Survey, and now carefully stored in the Yale Museum at New Haven; with a map of the most important locality at present known and suggestions to collectors visiting this, or other localities as to the most promising places and best methods to be employed in order to attain the greatest degree of success.

History of the Discovery of Laramie Horned Dinosaurs.

As early as 1872, Professor Cope[1] described under the name of *Agathaumas sylvestre* a portion of the skeleton of a horned dinosaur from Laramie beds near Black Butte in southwestern Wyoming. In various publications from 1874–1877 which appeared in THE AMERICAN NATURALIST, Proceedings Philadelphia Academy Sciences and Bulletins of the U. S. Geological Survey, Cope has added much to our knowledge of these strange forms, chiefly from material collected by himself and Mr. Charles H. Sternberg from the vicinity of Cow Island on the upper Missouri River in Montana.

In 1887 a new locality for horned dinosaurs was found near Denver, Colorado, by Mr. George L. Cannon. The most important specimen, consisting of a pair of horn cores, was sent to Professor Marsh for identification and description. They were not characteristic, and owing to their striking resemblance to the horns of certain fossil Bisons, they were referred by Marsh to that genus and described under the name of *Bison alticornis ;* the beds in which they were found being referred to late Pliocene and denominated the *Bison beds.*[2]

In 1888 the writer secured in the same locality in which Cope had operated in 1875 and 1876 on the upper Missouri, parts of several skulls of a horned dinosaur, some of which Marsh has described, creating for them a new genus *Ceratops*, and several new species. A comparison of the types of Cope's *Monoclonius recurvicornis* and Marsh's *Ceratops montanus,* both from the same locality in Montana, would doubtless establish the generic identity of the two.

Not until 1889 was a locality found where remains of these animals were sufficiently abundant and well preserved to afford material which would give us an adequate idea of their structure and habits. In the fall of 1888 the writer's attention was called to a pair of horncores belonging to Mr. C. A. Guernsey, of Douglas, Wyoming. Upon inquiry it was learned that they had been taken from a huge skull found by Mr. E. B. Wilson on Buck Creek, some of 35 miles north of Lusk, Wyoming. Early in the spring of 1889 the writer proceeded to Lusk, near which place Mr. Wilson still lived, and easily succeeded in getting that most accomodating gentleman to show him the skull from which he had taken the horns. This has proved a most important locality, and material obtained from it has increased many fold our knowledge of the Laramie reptilian and mammalian faunas. In the nearly four years spent by the writer in working these beds, 31 skulls and several fairly complete skeletons of horned dinosaurs were secured, besides two quite complete skeletons of *Diclonius* (*Claosaurus*), about 5000 isolated jaws and teeth of Laramie mammals and numerous remains of other dinosaurs, turtles, lizards, birds and fishes, as well as extensive collections of freshwater invertebrates from the same beds. In all over 300 large boxes of fossils were collected for the U. S. Geological Survey, and are now carefully stored in the Yale Museum, many of them as yet unopened.

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[1] Proc. Am. Phil. Soc., 1872, p. 482.

[2] See notice of new Fossil Mammals, Am. Jour. Sci., Oct., 1887.

At present remains of horned dinosaurs are known from only four widely separated localities; one of these, that of Black Butte, Wyoming, is west of the main range of the Rocky Mountains, and the other three including the Denver locality in Colorado; the Converse Co. locality in the extreme eastern portion of central Wyoming, and the Judith River or Cow Island locality in northern Montana, lie east of the main range. There are other localities known to the writer, but they are as yet of minor importance, since little collecting has been done in them and no material has been described from them. They will be referred to later.

The Ceratops Beds.

In the American Journal of Science for December, 1889, Professor Marsh applied the name *Ceratops beds* to certain strata in the west from which horned dinosaurs had been secured. He did not then, nor has he at any time since, designated just what he considered the geographical distribution of these beds nor their upper and lower delimitations in the geological scale. In order that the reader may not be misled in regard to Professor Marsh's position on this question I will quote him some-what fully. In speaking of the horned dinosaurs in the publication just cited he says: "The geological deposits, also, in which their remains are found have been carefully explored during the past season, and the known localities of importance examined by the writer, to ascertain what other fossils occur in them, and what were the special conditions which preserved so many relics of this unique fauna.

"The geological horizon of these strange reptiles is a distinct one in the upper Cretaceous, *and has now been traced nearly eight hundred miles along the eastern flank of the Rocky Mountains.* It is marked almost everywhere by remains of these reptiles, and hence the strata containing them may be called the Ceratops beds. They are freshwater or brackish deposits, which form a part of the so-called Laramie, *but are below the uppermost beds referred to that group.* In some places, at least, they rest upon marine beds which contain invertebrate fossils characteristic of the Fox Hills deposits." Italics mine.

If we accept literally Marsh's statement that the Ceratops beds have been traced for eight hundred miles along the eastern flank of the Rocky Mountains, it will be necessary to suppose that he includes in the Ceratops beds not only the beds in Converse Co., Wyoming, but also the *Bison beds* (*Denver beds of Cross*) at Denver, and the *Judith River beds* on the upper Missouri. These are very widely separated localities, and no attempt has ever been made to trace the continuity of the strata from the one to the other, nor is it at all probable that such an attempt would meet with success. Professor Marsh did in the autumn of 1889 spend nearly two days in the Converse Co. locality, and again in 1891 he spent one full day in the same locality; but his time was occupied in visiting a few of the localities in which dinosaur skulls and skeletons and Laramie mammals had been found. No time was taken to determine the upper and lower limits of the beds or to trace the outcrops of the strata. After his visit in 1889 when he spent nearly two days with our party in the Converse Co. locality, he took the train for Denver, and in the company of Mr. George L. Cannon of that city, he spent one-half day examining the *Bison beds* (Denver beds). This constitutes Professor

Marsh's *field work* in the *Ceratops beds*. In a total of three and one-half days field work he seems to have found sufficient time to " carefully explore " the geological deposits of the *Ceratops beds* and to trace them for " eight hundred miles along the eastern flank of the Rocky Mountains," besides making numerous other observations of scientific interest.

Of the many interesting vertebrate fossils described by Professor Marsh from the *Ceratops beds*, those from the Denver locality were secured by Messrs. Cross, Eldridge and Cannon, and those from Wyoming and Montana by the writer or men in his party, with one exception only, namely, the type of *Hadrosaurus breviceps*, which was received at New Haven many years ago, the locality on the label accompanying it being given as Bear Paw Mountains, Montana, which is of course incorrect, it doubtless is from the vicinity of Cow Island. With this one single exception I can confidently state that all the material described by Professor Marsh as from the Laramie or Ceratops beds of Wyoming is, without exception, from Converse Co., and was found within an area not exceeding fifteen miles in width from east to west by thirty miles in length from north to south ; and all the material described by him as from Montana, with the one exception mentioned, was found on the Missouri River between the mouth of Arrow Creek, just above Judith River, and the mouth of Cow Creek, some forty-five miles below, and never back farther than ten miles from the Missouri. It will thus be seen that the actually known area of the *Ceratops beds* is indeed very limited, and from these areas we should exclude certainly, the Judith River or upper Missouri and very likely the Black Butte locality in southwestern Wyoming. The beds of the former certainly and those of the latter almost certainly, belong to an older horizon than those of the Denver or Converse Co. localities; the latter may be considered as the typical locality for the Ceratops beds. All of the dinosaurs from the Judith River country are smaller, less specialized forms than those from the Converse Co. and Denver localities, as has already been observed by Marsh.

Marsh's statements that the Ceratops beds are below the uppermost beds referred to the Laramie and that they rest upon marine beds which contain invertebrate fossils characteristic of the Fox Hills deposits, may well be questioned, especially if we exclude from the *Ceratops beds* the *Judith River beds* and refer them to a lower horizon, retaining for them the name *Judith River beds.* At no place in the Converse Co. region do the *true Ceratops beds,* with remains of horned dinosaurs, rest upon true marine Fox Hills sediments; nor are the Ceratops beds in this region overlaid by strata which could be referred without doubt to the Laramie. The writer has, in a paper published in the American Journal of Science of February, 1893, stated that the *Ceratops beds* rest directly upon the *Fox Hills* series, and has provisionally referred the very similar series of sandstones and shales conformably overlying the *Ceratops beds* to the upper Laramie; but it would doubtless be better to restrict the limits of the Ceratops beds to those strata in which horned dinosaurs occur, and to consider the underlying 400 feet of barren sandstones as the equivalent of the *Judith River beds.* Future investigations will doubtless show that the sandstones, shales and lignites overlying the typical Ceratops beds in Converse Co. should be referred to the *Fort Union beds* and not to the Laramie, as, according to Knowlton, the limited flora sent him now indicates.

The terms Fox Hills and Laramie as now used cannot be taken to represent distinct and different periods of time. for as has been shown by G. M. Dawson, Selwyn and McConnell in the Belly River region in Canada, and frequently observed by the writer on the upper Missouri in Montana, marine beds with typical Fox Hills fossils have been found interstratified with fresh and brackish water beds containing characteristic Laramie fossils, showing conclusively that the two periods were in part at least contemporaneous; the one representing the marine and the other fresh or brackish water forms existing at the same time and in not widely separated regions, these alternations in the nature of the fauna in the same locality having been brought about by successive encroachments and recessions of the sea. It is not at all impossible that in the region of Converse Co., Wyoming, marine conditions prevailed continuously until late in Laramie times, and that during the time of the deposition of the Laramie beds of the Judith River and Black Butte localities, marine beds with Fox Hills types of fossils were being deposited over the region of what is now eastern and central Wyoming. This would account for the absence in this region, of the lower Laramie, with the smaller and less specialized horned, and other dinosaurs, characteristic of it.

Other Localities for Horned Dinosaurs.

In addition to the localities already mentioned, the writer has seen remains of horned dinosaurs and Hadrosauridæ on the North Platte River opposite the mouth of the Medicine Bow, about 35 miles below Fort Steele, Wyoming; along the eastern flank of the Big Horn Mountains about 40 miles south of Buffalo, Wyoming; on the west side of the Big Horn River between Fort Custer and Custer Station, Montana; and on Willow Creek 13 miles north of Musselshell postoffice in Montana. Another region not examined, but which looked very promising, is near the town of Havre on the Great Northern Railroad just north of the Bear Paw Mountains in northern Montana.

Suggestions to Collectors.

Of all the localities for Laramie dinosaurs and mammals known to the writer, that of Converse Co., Wyoming, is by far the most promising, and the earnest and intelligent collector will there meet with a fair amount of success for many years to come. As will be seen, by reference to the map accompanying this paper, this region is easy of access from the town of Lusk on the F. E. and M. V. R. R. At this station all necessary camp supplies can be obtained. The fossil beds are easily worked, the country being quite open and its surface not disfigured by deep and impassable cañons. There is abundant grass for horses, wood for fuel, and frequent small springs of fairly good water.

Vertebrate fossils are never abundant in the Laramie, but every exposure in this region should be carefully searched and especially the large sandstone concretions which contain many of the best skulls and skeletons found in these beds. Fossils are found in both the shales and sandstones, but are best preserved in the latter. The small mammals are pretty generally distributed but are never abundant, and on account of their small size are seen with difficulty. They will be most frequently found in what are locally known as "blow outs" and are almost always associated with garpike scales and teeth, and teeth and bones of other fish, crocodiles, lizards and small dinosaurs. These remains are frequently so abundant in "blow outs" as to easily attract attention, and when such a place is found careful search will almost always be rewarded by the discovery of a few jaws and teeth of mammals. In such places the ant hills, which in this region are quite numerous, should be carefully inspected as they will almost always yield a goodly number of mammal teeth. It is well to be provided with a small flour sifter with which to sift the sand contained in these ant hills, thus freeing it of the finer materials and subjecting the coarser material remaining in the sieve to a thorough inspection for mammals. By this method the writer has frequently secured from 200 to 300 teeth and jaws from one ant hill. In localities where these ants have not yet established themselves, but where mammals are found to be fairly abundant it is well to bring a few shovels full of sand with ants from other ant hills which are sure to be found in the vicinity, and plant them on the mammal locality. They will at once establish new colonies and, if visited in succeeding years, will be found to have done efficient service in collecting mammal teeth and other small fossils, together with small gravels, all used in the construction of their future homes. As an instance of this, I will mention that when spending two days in this region in 1893, I introduced a colony of ants in a mammal locality, and on revisiting the same place last season I secured in a short time from the exterior of this one hill 33 mammal teeth.

Another way to secure these small teeth is to transport the material to a small stream and there wash it in a large sieve in the water, the finer material being washed away, but this treatment is too harsh to give the best results, what few jaws there are always being broken to bits.

In the map accompanying this paper the dotted line marked Cer. border, indicates approximately the boundaries of the *Ceratops beds* in Converse Co. The line to the south and east indicating the outcrop of the beds, that to the west the point where they pass under the overlying beds. They extend on uninterruptedly into Weston Co., but have not been worked farther north than Schneider Creek. A working party encamped at the mouth of Schneider Creek on the Cheyenne River, would doubtless meet with much success. The map explains itself; it was drawn by the writer to accompany his paper on the Ceratops beds above referred to, but was not then published. A copy of it was given by him to Professor Marsh and a portion of it redrawn, will appear in the 16th Annual Report of the U. S. Geological Survey accompanying a memoir by Professor Marsh.

Princeton, N. J., Jan. 6, 1896.

RECENT LITERATURE.

Recent Books on Vegetable Pathology.—(1) Kirchner, Dr. Oskar: *Die Krankheiten und Beschädigungen unserer landwirtschaftlichen Kulturpflanzen.* Stuttgart, 1890, pp. VI, 637; (2) Comes, Dr. O.: *Crittogamia Agraria.* Naples, 1891, pp. 600; (3) Ward, Dr. H. Marshall: *Diseases of Plants.* London, (no date), pp. 196; (4) Ludwig, Dr. Friedrich: *Lehrbuch der niederen Kryptogamen.* Stuttgart, 1892, pp. XV, 672; (5) Tubeuf, Dr. Karl Freiherr von: *Pflanzenkrankheiten durch Kryptogame Parasiten verursacht.* Berlin, 1895, pp. XII, 599; (6) Frank, Dr. A. B.: *Die Krankheiten der Pflanzen.* Breslau, 1895–1896, Vol. 1, pp. XII, 344; Vol. II, pp. XI, 574; (7) Prillieux, Ed.: *Maladies des Plantes agricoles et des arbres fruitiers et forestiers causé par des parasites végétaux.* Paris, 1895, Vol. I, pp. XVI, 421.

It is desired only to call attention to these books at this time by means of the briefest mention. Some have been published long enough to enable one to speak freely of their merits and demerits; others are very recent additions to the literature of vegetable pathology and use has not yet demonstrated strong or weak points.

PLATE I

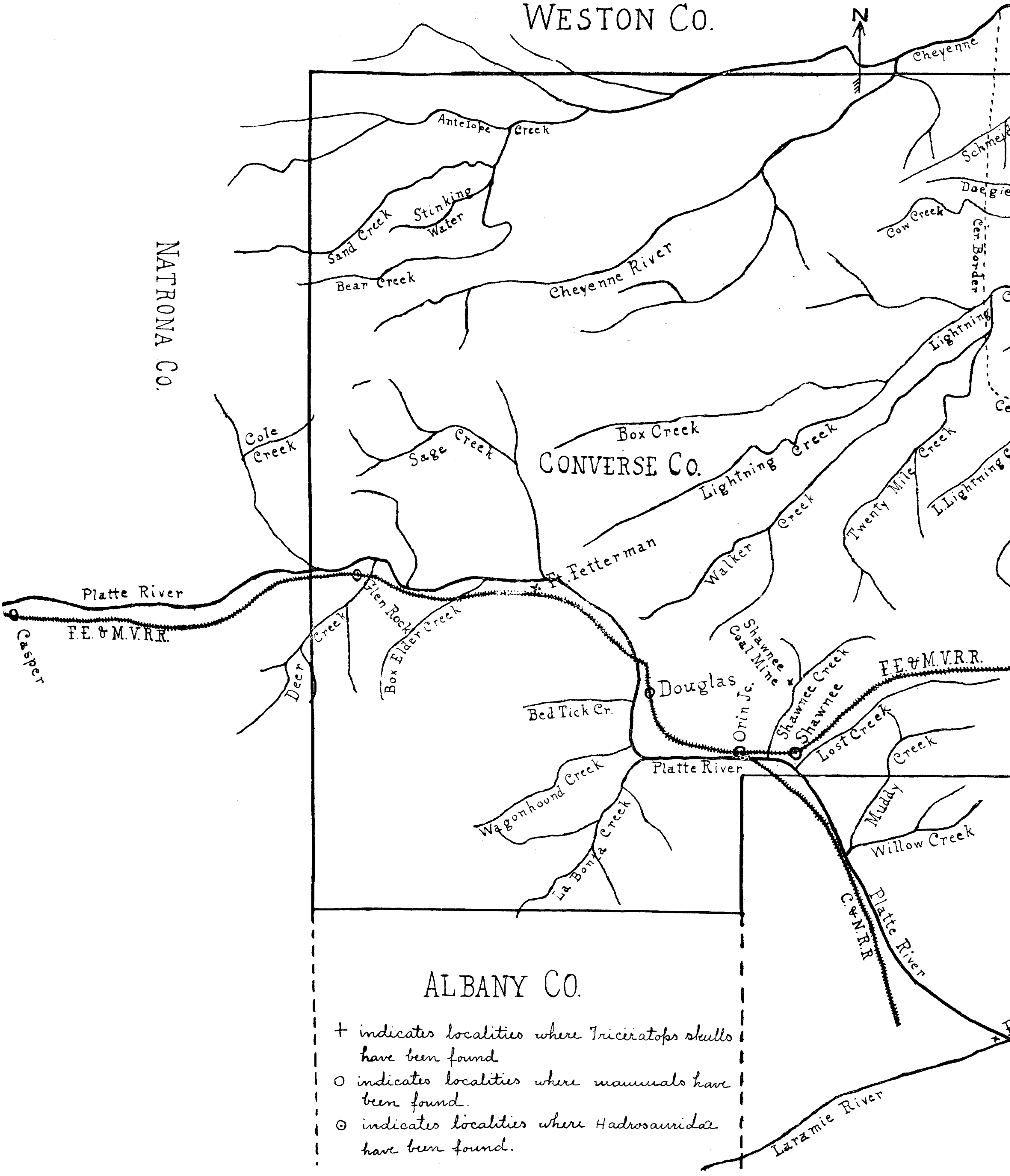
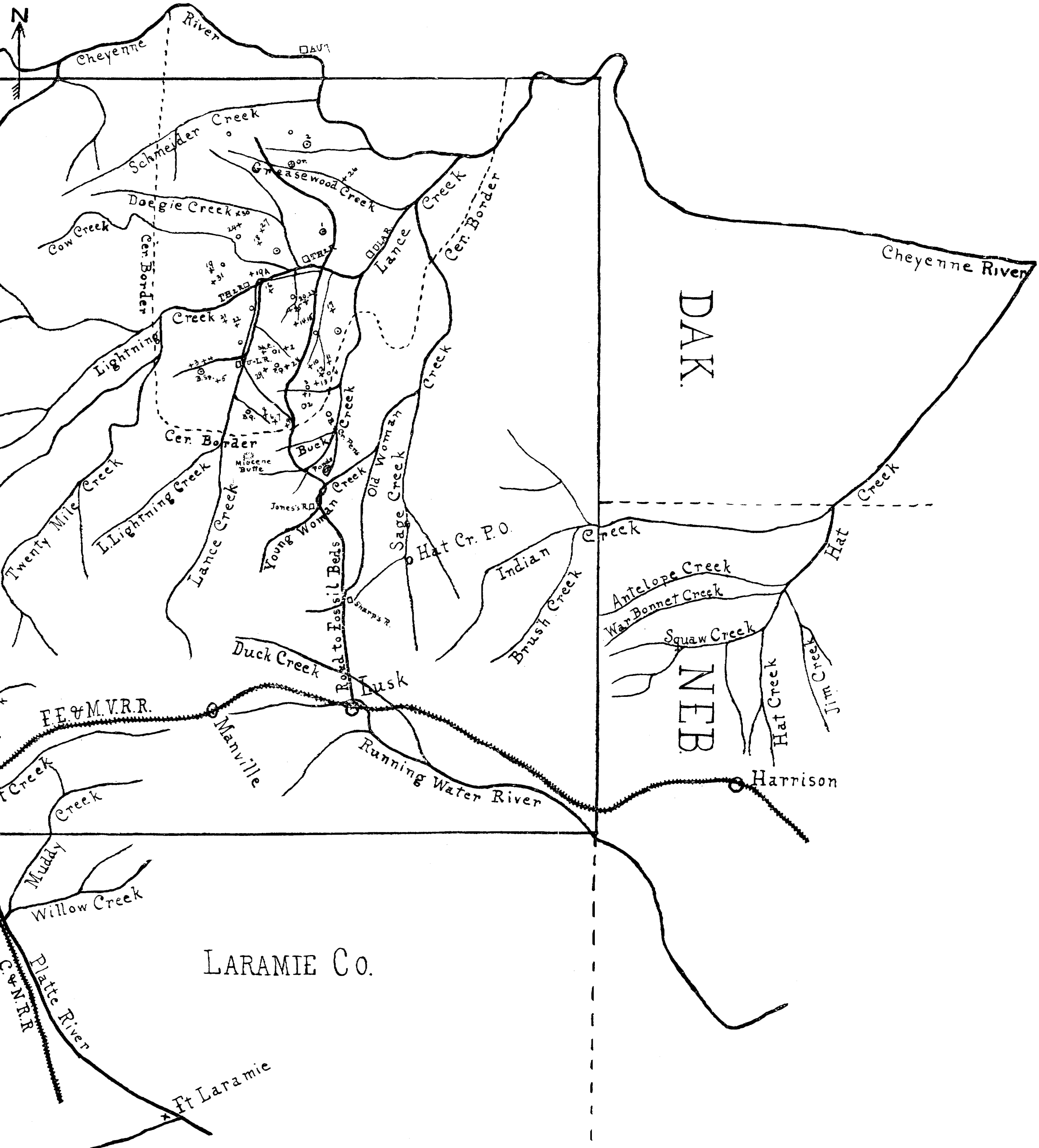

WESTON CO.
N
Cheyenne
Antelope Creek
Schme
Doegie
Cow Creek
Sand Creek
Stinking Water
Bear Creek
Cheyenne River
Cer. Border
NATRONA CO.
Lightning
Cole Creek
Sage Creek
Box Creek
CONVERSE CO.
Lightning Creek
Twenty Mile Creek
L. Lightning
Creek
Walker
Ft. Fetterman
Platte River
F.E. & M.V.R.R.
Casper
Glen Rock
Deer Creek
Box Elder Creek
Douglas
Shawnee Coal Mine
Shawnee Creek
Shawnee
Orin Jc.
F.E. & M.V.R.R.
Bed Tick Cr.
Lost Creek
Muddy Creek
Platte River
Wagonhound Creek
La Bonta Creek
Willow Creek
C. & N.R.R.
Platte River
ALBANY CO.
Laramie River
+ indicates localities where Triceratops skulls have been found
○ indicates localities where mammals have been found.
⊙ indicates localities where Hadrosauridæ have been found.

PLATE III.



MAP OF CONVERSE COUNTY, WYOMING.
SCALE ABOUT 16 MILES TO THE INCH.